

AMENDMENT AND RESPONSE

Serial Number: 09/132,157

Filing Date: August 11, 1998

Title: SILICON-GERMANIUM DEVICES FOR CMOS FORMED BY ION IMPLANTATION AND SOLID PHASE EPITAXIAL REGROWTH

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25. (Once amended) A semiconductor transistor formed on a silicon substrate, comprising:

a Si_{1-x}Ge_x channel region, having a germanium molar fraction of x, and formed in the substrate, underneath a gate oxide and between a source region and a drain region;[The transistor of claim 24,]

wherein the Si_{1-x}Ge_x channel region is formed from ion implanting germanium (Ge) into the substrate at a dose of approximately 2×10^{16} atoms/cm², and wherein the Ge is implanted at an energy of approximately 20 to 100 keV[.]; and

wherein the Si_{1-x}Ge_x channel region has a channel length less than 7μm.

26. (Once amended) The transistor of claim 24, wherein the Ge is dispersed in the substrate to a depth of approximately 100 to 1,000 angstroms.

27. (Once amended) The transistor of claim 24, wherein the Ge is dispersed in the substrate to a depth of approximately 300 angstroms.

28. (Once amended) A semiconductor transistor formed on a silicon substrate, comprising:

a Si_{1-x}Ge_x channel region, having a germanium molar fraction of 0.2, and formed in the substrate, underneath and adjacent a gate oxide and between a source region and a drain region[.];

wherein the Si_{1-x}Ge_x channel region has a channel length less than 7μm.

30. (Once amended) A transistor on a silicon substrate, wherein the transistor includes a channel comprising a silicon-germanium (Si-Ge) alloy underneath and adjacent a gate oxide, wherein the channel has a channel length less than 7μm.

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32. (Once amended) The transistor of claim 30, wherein, the Si-Ge alloy was formed by a process comprising:

ion implanting Ge ions through [a]the gate oxide on the substrate at a dose of approximately 2×10^{16} atoms/cm², and wherein the Ge was implanted at an energy of approximately 20 to 100 keV; and

annealing the substrate in a furnace at a temperature of approximately 450 to 700 degrees Celsius.

33. (Once amended) A p-channel metal-oxide semiconductor (PMOS) field effect transistor formed on a substrate, comprising:

a silicon-germanium to silicon (Si_{1-x}Ge_x/Si) heterojunction formed between the substrate and a channel region, wherein the germanium (Ge) in the heterojunction has a molar fraction of x, and wherein the channel region has a channel length of less than 7μm.

REMARKS

Claims 26 and 27 are amended herein to correct clerical omissions of the term "claim" and thus are not amended in response to any art rejections.

Rejections Under 35 U.S.C. § 102

Nayak et al.

Claims 11-14, 24, 26, 28-31 and 33-35 were rejected under 35 U.S.C. § 102(b) as anticipated by Nayak et al. (IEEE Electron Device Letters, Vol. 12, No. 4, April 1991, pages 15-16).

Independent claim 11 is amended herein to recite a Si_{1-x}Ge_x channel region, having a germanium molar fraction of x, and formed in the substrate, underneath and adjacent the gate oxide and between the source/drain regions. Independent claim 24 is amended herein to recite a Si_{1-x}Ge_x channel region, having a germanium molar fraction of x, and formed in the substrate, underneath and adjacent a gate oxide and between a source region and a drain region.

Independent claim 28 is amended herein to recite a Si_{1-x}Ge_x channel region, having a germanium molar fraction of 0.2, and formed in the substrate, underneath and adjacent a gate oxide and